

S/075/60/015/003/013/033/XX
B005/B066

AUTHORS: Busev, A. I. and Tiptsova, V. G.

TITLE: Investigations in the Field of the Analytical Chemistry of
Thallium. Communication 4. Diantipyryl Propyl Methane as
Reagent for the Quantitative Thallium Determination

PERIODICAL: Zhurnal analiticheskoy khimii, 1960, Vol. 15, No. 3,
pp. 291 - 294

TEXT: The authors of the present report studied the applicability of
aliphatically substituted diantipyryl methanes for the quantitative
precipitation of trivalent thallium in the presence of chloride and
bromide ions. By condensing antipyrine with acetaldehyde and butyraldehyde
in hydrochloric acid medium diantipyryl methyl methane and diantipyryl
propyl methane were synthesized. These two derivatives of diantipyryl
methane precipitate the bromide complexes of thallium quantitatively,
while the thallium chloride complexes are quantitatively precipitated only
by diantipyryl propyl methane. For this reason only diantipyryl propyl
methane was used for the further studies, the synthesis of which is

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Investigations in the Field of the Analytical Chemistry of Thallium. Communication 4. Di-antipyryl Propyl Methane as Reagent for the Quantitative Thallium Determination S/075/60/015/003/013/033/XX B005/B066

described in an experimental part. After the above-mentioned acid condensation the solution is neutralized by aqueous ammonia (1:1), in which connection diantipyryl propyl methane precipitates which melts at 155-156°C after recrystallization from methanol. The yield of the synthesis is practically quantitative. For the gravimetric determination of thallium a 1% solution of this reagent in acetic acid (1:1) was used. 5-10 ml of concentrated HCl (or HBr) and 6-8 ml of the reagent solution were added to a solution which contained 20-30 mg thallium in the sulfate form. The resultant precipitate was filtered, washed several times with water and then recrystallized from an acetone-alcohol mixture. The chloride complex (I) of thallium with the reagent is slightly yellow and melts at 56-57°C, while the corresponding bromine compound (II) is green-yellow and melts at 128-129°C. The solubilities of these two compounds in water are on the average $5.7 \cdot 10^{-5}$ moles/l at 20°C (compound (I)), and $6.7 \cdot 10^{-6}$ moles/l, respectively (compound (II)). The elementary analysis gave the formula $C_{26}H_{30}O_2N_4 \cdot HTlCl_4$ for compound (I), the formula $C_{26}H_{30}O_2N_4 \cdot HTlBr_4$ for

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Investigations in the Field of the Analytical Chemistry of Thallium. Communication 4. Di-antipyryl Propyl Methane as Reagent for the Quantitative Thallium Determination S/075/60/015/003/013/033/XX B005/B066

compound (II). Both compounds can be weighed out directly. The authors investigated the effects of the bromine ion concentration and of the acidity of the solution on the determination of thallium as $C_{26}H_{30}O_2N_4 \cdot HTlBr_4$. Changes of the bromide concentration from 0.1 M to 1 M do not appreciably influence the results of the determination (Table 2). At a bromine ion concentration of 2 moles/l the reagent precipitates, so that the results obtained are too high. The acidity of the solution does not influence the completeness of the precipitation in the range of 0.1 N to 5 N H_2SO_4 (Table 3). In the determination of thallium as $C_{26}H_{30}O_2N_4 \cdot HTlCl_4$ neither the chlorine ion concentration (> 0.1 M) nor the acidity (1 N - 6 N HCl) affect the completeness of the precipitation (Table 4). While in the determination of thallium in the form of the bromide complex the same ions disturb as in the analogous precipitation with diantipyryl-methane (Ref. 1), the determination of thallium in the form of the chloride complex may be carried out in the presence of zinc, copper, cadmium, bismuth, indium, aluminum, magnesium, iron(III) and of

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Investigations in the Field of the Analytical Chemistry of Thallium. Communication 4. Di- antipyril Propyl Methane as Reagent for the Quantitative Thallium Determination S/075/60/015/003/013/033/XX B005/B066

the anions AsO_4^{3-} and PO_4^{3-} . In this case the solution must contain at least 3 M HCl when being precipitating. Ga , Sn^{IV} , Hg^{2+} , $\text{Cr}_2\text{O}_7^{2-}$, ClO_4^- , and MoO_4^{2-} disturb the determination. The method described was applied to the determination of thallium in cadmium. The proceeding is given. The method has a much higher selectivity than the method, described in publications, of precipitating thallium as $[(\text{C}_6\text{H}_5)_4\text{As}]\text{TlCl}_4$. There are 1 figure, 5 tables, and 5 references: 4 Soviet and 1 US.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: June 12, 1959

Card 4/4

BUSEV, A.I.; CHZHAN FAN' [Chang Fan]

Determination of thiomalic acid. Vest. Mosk un. Ser. 2: Khim. 15
no.4:52-54 JI-Ag '60. (MIRA 13:9)

1. Kafedra analiticheskoy khimii Moskovskogo universiteta.
(Succinic acid)

BUSEV, A.I.; TIPTSOVA, V.G.; SOKOLOVA, T.A.

Stability constants of chloride and bromide complexes of trivalent thallium. Vest. Mosk. un. Ser. 2:42-45 N-D '60. (MIRA 14:2)

1. Kafedra analiticheskoy Khimii Moskovskogo universiteta.
(Thallium compounds)

BUSEV, A.I.; CHZHAN FAN' [Chang Fan]

Photometric determination of scandium with the use of α -(2,4-dihydroxy-phenylazo)-pyridine. Vest. Mosk. un. Ser. 2: Fhiz. 15 no.6:46-51
N-D '60. (MIRA 14:2)

1. Kafedra analiticheskoy khimii Moskovskogo universiteta.
(Scandium--Analysis) (Pyridine)

BUSEV, A.I.; TIPTSOVA, V.G.; SOKOLOVA, T.A.

Reaction of trivalent thallium with disodium ethylenediaminetetra-
acetate.. Zhur. neorg. khim. 5 no. 12:2749-2758 D '60.
(MIRA 13:12)

1. Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova.
(Thallium compounds) (Acetic acid)

KNUNYANTS, I.L., glav. red.; BAKHAROVSKIY, G.Ya., zam. glav. red.;
BUSEV, A.I., red.; VARSHAVSKIY, Ya.M., red.; GEL'FERIN,
N.I., red.; DOLIN, P.I., red.; KIREYEV, V.A., red.; MEYERSON,
G.A., red.; MURIN, A.N., red.; POGODIN, S.A., red.; REBINDER,
P.A., red.; SLONIMSKIY, G.S., red.; STEPANENKO, B.N., red.;
EPSHTEYN, D.A., red.; VASKEVICH, D.N., nauchnyy red.; GALLE,
R.R., nauchnyy red.; GARKOVENKO, R.V., nauchnyy red.; GODIN,
Z.I., nauchnyy red.; MOSTOVENKO, N.P., nauchnyy red.;
LEBEDEVA, V.A., mladshiy red.; TRUKHANOVA, M.Ye., mladshiy
red.; FILIPPOVA, K.V., mladshiy red.; ZHAROVA, Ye.I., red.;
KULIDZHANOVA, I.D., tekhn. red.

[Concise chemical encyclopedia] Kratkaia khimicheskaiia entsiklo-
pediia. Red. koll.: I.L.Knuniants i dr. Moskva, Gos. nauchn.
izd-vo "Sovetskaia entsiklopediia." Vol.1. A - E. 1961.
1262 columns. (MIRA 15:2)

(Chemistry--Dictionaries)

BUSEV, A. I.

PHASE I BOOK EXPLOITATION

SOV/5777

Vinogradov, A. P., Academician, and D. I. Ryabchikov, Doctor of Chemical Sciences, Professor, Resp. Eds.

Metody opredeleniya i analiza redkikh elementov (Methods for the Detection and Analysis of Rare Elements) Moscow, Izd-vo AN SSSR, 1961. 667 p. Errata slip inserted. 6000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut geokhimii i analiticheskoy khimii im. V. I. Vernadskogo.

Ed. of Publishing House: M. P. Volynets; Tech. Ed.: O. Gus'kova.

PURPOSE: This book is intended for analytical chemists and for students of analytical chemistry.

COVERAGE: The handbook was published in accordance with a decision of the Vsesoyuznoye soveshchaniye po analizu redkikh elementov (All-Union Conference on the Analysis of Rare Elements) called

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Methods for the Detection (Cont.)

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together by the Gosudarstvennyy nauchno-tekhnicheskii komitet Soveta Ministrov SSSR (State Scientific and Technical Committee of the Council of Ministers of the USSR) and the Academy of Sciences USSR in December, 1959. The material is arranged in accordance with the group position of elements in the periodic system, and each section is prefaced by an article discussing the analytical methods most used in the Soviet and non-Soviet countries. Each section deals with the physical, physicochemical, and chemical methods for the analysis of raw materials, semi-products, and pure metals, and is accompanied by an extensive bibliography listing works published in the field in recent years. The following are mentioned for their help in preparing the book for publication: I. P. Alimarin, G. N. Bilimovich, A. I. Busev, E. Ye. Vaynshteyn, M. P. Volynets, V. G. Goryushina, A. M. Dymov, S. V. Yelinson, O. Ye. Zvyagintsev, G. M. Kolosova, Ye. K. Korchemnaya, V. I. Lebedev, G. A. Kalofeyeva, B. N. Molent'yev, V. A. Nazarenko, I. I. Nazarenko, T. V. Petrova, N. S. Poluektov, A. I. Ponomarev, V. A. Ryabukhin, N. S. Stroganova, and Yu. A. Chernikhov.

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Methods for the Detection (Cont.)

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Analytical Chemistry of the Rare Earth Elements, Scandium and Yttrium

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Busev, A. I., and V. G. Tiptsova. Present State of the Analytical Chemistry of Thallium

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Busev, A. I., and L. M. Skrebkova. Present State of the Analytical Chemistry of Gallium

201

Melent'yev, B. N., and A. I. Ponomarev. Present State of the Analytical Chemistry of Titanium

238

Yelinson, S. V. Present State of the Analytical Chemistry of Zirconium and Hafnium

303

Ryabchikov, D. I., and D. I. Korchemnaya. Present State of the Analytical Chemistry of Thorium

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Methods for the Detection (Cont.)

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Hazarenko, V. A. Present State of the Analytical Chemistry of Germanium

400

Zolotarev, V. L. Present State of the Analytical Chemistry of Vanadium

462

Alimarin, I. P., and G. M. Bilimovich. Present State of the Analytical Chemistry of Tantalum and Niobium

487

Eusev, A. I. Present State of the Analytical Chemistry of Molybdenum

537

Troitskaya, M. I. Present State of the Analytical Chemistry of Selenium and Tellurium

580

Ryabchikov, D. I., and Yu. B. Gerlit. Present State of the Analytical Chemistry of Rhenium

628

AVAILABLE: Library of Congress

Card 5/5

JA/rsm/ec
12-1-61

Dialkyl and Diaryl Dithiophosphoric Acids as
Analytical Reagents. Communication VII. Ammetric
and Visual Titration of Lead With Nickel Diethyl
Dithiophosphate in the Presence of Barium, Calcium,
Zinc and Other Elements

SOV/75-13-6-4/21

concentration of HNO_3 exerts within wide limits (0.01-4 n)
no influence upon the results of titration, if urea is added
to the solution to be titrated. Chloride ions in quantities
that do not cause any precipitation of PbCl_2 do not interfere
with. This is an excellent method due to its simple perform-
ance although it lasts somewhat longer than most of the usual
methods of titration. Both methods devised supply very
accurate results. There are 3 tables and 15 references, 10
of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova
(Moscow State University imeni M. V. Lomonosov)

SUBMITTED: October 10, 1956

Card 4/4

AUTHORS: Busev, A.I., Kiseleva, L.V., Cherkesov, A.I. 32-1-3/55

TITLE: The Complexometric Determination of Thorium by Means of 1-(2-Pyridilazo)-2-Naphthol as Natural Indicator (Kompleksometricheskoye opredeleniye toriya s 1-(2-piridilazo)-2-naftolom v kachestve indikatora).

PERIODICAL: Zavodskaya Laboratoriya, 1958, Vol. 24, Nr 1, pp. 13-16 (USSR)

ABSTRACT: The indicator mentioned, which is known in Soviet scientific literature under the name of "PAN", was used also by Flaschka and Abdine [Ref. 2], but in a different form. A comparison of the method used by them with that suggested here showed that, in the case of the method developed by Flaschka and Abdine, the presence of a large number of secondary ions influences the change of color. According to the method recommended here, the solution of the indicator and its bonds is used in an aqueous solution of methyl alcohol (50%). For purposes of measuring the spectrophotometer "Cφ-4" is used. As stated here, the change of color, it is true, is less distinct in the case of the method suggested than is the case with the method developed by Flaschka and Abdine, but the selectivity of the indicator is considerably greater. (There follows a description of the experiment). The following disturbing elements are mentioned: An excessive

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. The Complexometric Determination of Thorium by Means of
1-(2-Pyridilazo)-2-Naphthol as Natural Indicator

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quantity of lead leads to the forming of trilon; the presence of mercury of tin causes the color to become dim; further disturbance is also caused by a content of trivalent iron-, bismuth-, indium- and vanadium. A content of iron has no disturbing effect if ascorbic acid is added to the solution. Disturbance is also caused by anions which form complex compounds or a common precipitation with thorium. The method suggested is used for the analysis of monazite sand as well as of other materials from which phosphoric acid must first be removed. There are 2 figures, 3 tables and 9 references, 3 of which are Slavic.

ASSOCIATION: State University imeni M.V. Lomonosov, Moscow (Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova).

AVAILABLE: Library of Congress

Card 2/2 1. Thorium-Determination 2. Thorium-Detection

AUTHORS: Busev, A.I., Ivanyutin, M.I., Foygina, E.M. 32-3-3/52

TITLE: A Colorimetric Method of Determining Copper in Nickel
Electrolytes (Kolorimetricheskiy metod opredeleniya medi v
nikelevykh elektrolitakh)

PERIODICAL: Zavodskaya Laboratoriya, 1958, Vol. 24, Nr 3, pp. 265-266 (USSR)

ABSTRACT: A method for the rapid colorimetric determination of copper was developed on the basis of the reaction of the Cu^{2+} ion in a weakly acid medium with nickeldiethyldithiophosphate, for hereby the copperdiethyldithiophosphate of deep yellow-orange color, which is extracted in the course of the analysis mentioned with carbon tetrachloride, and which is insoluble in water but is soluble in any organic solvent, is produced. The nickeldiethyldithiophosphate can be produced by the method developed by A.I. Busev and M.I. Ivanyutin [Refs. 1 and 2], and will within short be available from the All-Union Scientific Research Institute for Reagents; it will be added to the extract in form of a 0.001 molar solution.

Card 1/2 A standard sample serves the purpose of comparing colors

A Colorimetric Method of Determining Copper in
Nickel Electrolytes

32-3-3/52

(0.02 mg/Cu/1 ml) and the final result is computed according to a formula. Also the sample investigated should not contain more than 2 mg/l copper, because otherwise the colorless Cu^+ diethyl-dithiophosphate is produced and the accuracy of the method is impaired. There are 2 tables, and 1 reference, 1 of which is Slavic.

ASSOCIATION: Moscow State University imeni M.V.Lomonosov, Central Institute for Aviation Lubricants (Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova i Tsentral'nyy institut aviatsionnykh masel)

AVAILABLE: Library of Congress

1. Electrolytes-Nickel methods--Applications
2. Copper--Determination
3. Colorimetric

Card 2/2

5(0), 5(2)

SOV/32-24-12-14/45

AUTHORS: Busev, A. I., Petrenko, A. G.

TITLE: ~~Complexometric~~ Indicators (Kompleksometriicheskiye indikatory)
Review (Obzor)

PERIODICAL: Zavodskaya Laboratoriya, 1958, Vol 24, Nr 12, pp 1449-1457
(USSR)

ABSTRACT: This type of indicator is divided into two main groups, the metallic, pM indicators, and the redox indicators. After an explanation of the possibilities of application and the type of reaction involved the complexometric indicators are listed individually in groups. Listed are the 2,2'-dioxy-azo dyes, o-monosubstituted dyes, o,o'-disubstituted azo dyes, phthalein and triphenyl methane dyes, phenol derivatives, anthraquinone dyes, indicators with nitrogen atoms in the ring, and stable pM indicators. The redox indicators are especially emphasized. It is shown that of the dyes mainly used in neutral or alkaline media the 2,2'-dioxy-azo dyes have been most completely investigated. These dyes are used mainly in neutral or alkaline media. Among the few indicators used in acid media, 1-(2-pyridyl-azo)-2-naphthol and similar compounds are of interest.

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SOV/32-24-12-14/45

Complexometric Indicators. Review

That there are relatively few redox complexometric indicators and methods is a result of the complicated working techniques required to use them and the difficulty in synthesizing indicators of this type. It is shown that the lack of new indicators could be remedied by carrying out syntheses involving the introduction of new, analytically active radicals into the molecule. There are 163 references, 23 of which are Soviet.

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5(2)

SOV/156-59-1-25/54

AUTHORS: Busev, A. I., Tiptsova, V. G.

TITLE: The Photometric Determination of Thallium With Tetramethyl-diaminodiphenyl-antipyryl-carbinol (Fotometricheskoye opredeleniye talliya s pomoshch'yu tetrametildiaminodifenil-antipirilkarbinola)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Khimiya i khimicheskaya tekhnologiya, 1959, Nr 1, pp 105-107 (USSR)

ABSTRACT: The reactions of methyl violet, crystal violet, brilliant green, rhodamine etc with certain heavy metals (Zn, Au, Sb, Tl etc) are known. Difficultly soluble compounds are formed, which can be extracted with benzene or benzene homologs whereas the dyestuff itself is not extracted. These dyestuffs, however, require a very high concentration of acid and ions etc and are not selective enough. Tetramethyl-diaminodiphenyl-antipyryl-carbinol, which has been proposed by Zhivopistsev (Ref 12) for the qualitative determination of zinc in the presence of rhodanum ions was investigated as a reagent for $TlCl_4$ ions. In the presence of chlorine- or bromine ions a

Card 1/3 blue-violet precipitate is formed, which can be extracted with

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The Photometric Determination of Thallium With Tetramethyldiaminodiphenyl-antipyryl-carbinol

ether or benzene. The organic solvent assumes an emerald-green color. The reagent itself is not soluble in ether or benzene. Only in the presence of bromine ions does part of the reagent enter into the organic solution as bromide. For this reason a restriction was necessary to the extraction of thallium in the presence of chlorine ions. For this purpose a mixture of 2 parts by volume benzene with 3 parts by volume carbon tetrachloride is recommended. The large surplus of the reagent required has been investigated by experiments. The light absorption curve has a maximum at 638 mμ (Diagram, Fig 1). The influence of the acid concentration on the optical density is insignificant between 0.1-1 n HCl (Diagram, Fig 2). From 2 n HCl upward the optical density decreases to be zero at 5 n HCl, which means that a colored compound is not formed in strong hydrochloric acid. In this range the optical density is proportional to the concentration (Diagram, Fig 3). 1-20 γ thallium in 10 mole solution can be determined by this method. The molar extinction coefficient is 68000 at 638 mμ. Whereas CdCl_4^{2-} , BiCl_4^- , MnO_4^{2-} , VO_4^{2-} form colored pre-

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The Photometric Determination of Thallium With Tetramethyldiaminodiphenylantipyryl-carbinol

precipitates with the reagent, these precipitates, however, cannot be extracted. Hg, Sb, Sn react as complex chlorides like thallium. Fe^{3+} and Cu^{2+} do not disturb themselves even at a ratio of Tl : Fe (or Cu) = 1 : 100,000. Appreciation is expressed to V. P. Zhivopistsev for having provide the reagent. There are 3 figures and 12 references, 10 of which are Soviet.

ASSOCIATION: Kafedra analiticheskoy khimii Moskovskogo gosudarstvennogo universiteta im. M. V. Lomonosova
(Chair of Analytical Chemistry of Moscow State University imeni M. V. Lomonosov)

SUBMITTED: September 8, 1958

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5(2)

SOV/156-59-2-20/48

AUTHORS: Busev, A. I., Kanayev, N. A.

TITLE: The Direct Complexometric Titration of Indium Using α -(2,4-Dioxyphenylazo)-pyridine as Indicator (Pryamoye kompleksometricheskoye titrovaniye indiya s ispol'zovaniyem α -(2,4-dioksifenilazo)piridina v kachestve indikatora)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Khimiya i khimicheskaya tekhnologiya, 1959, Nr 2, pp 299-301 (USSR)

ABSTRACT: The compound mentioned in the title also called 4-(α -pyridyl-azo)-resorcin (PAR) is suggested instead of the indicators of references 2 - 11 for the titration of indium with complexon III (disodium salt of ethylenediamine tetraacetic acid). A figure shows that the maxima of the light absorption of the free indicator and its indium compound lie in sufficiently long distance in order to secure an exact observation of the color change. Titration takes place at pH 2.3 - 2.5. A table shows the results of analyses. There are 1 figure, 1 table, and 15 references, 3 of which are Soviet, and 2 Czechoslovakian.

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SOV/156-59-2-20/48

The Direct Complexonometric Titration of Indium Using α -2,4-Dioxyphenyl-azo)-pyridine as Indicator

PRESENTED BY: Kafedra analiticheskoy khimii Moskovskogo gosudarstvennogo universiteta im. M. V. Lomonosova
(Chair of Analytical Chemistry, Moscow State University
imeni M. V. Lomonosov)

SUBMITTED: October 24, 1958

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95-59-3-29/32

Lapitskiy: A.V.

Kapititskiy, A. V.
 The First All-Union Conference of Universities and Colleges
 on Radiophysics
 Seriya matematiki, mekhaniki,
 Vostnik Moskovskogo universiteta, vol. 8, no. 2, pp. 221-225 (1958)

OPTICAL:

ABSTRACT:

[illegible]

2/1 p.303

[illegible]

Case 2/4

[illegible]

card 3/3

BUSEV, A.I.; KUZNETSOV, V.I., prof.; SHILOV, Yu.M., kand.farmatsevticheskikh nauk; TARASENKO, M.I., kand.khim.nauk

"Analytical chemistry" by F.M.Shemiakin, A.N.Karpov, A.N.Brusentsov. Reviewed by A.I.Busev and others. Apt.delo
8 no.2:90-93 Mr-Ap '59. (MIRA 12:5)
(CHEMISTRY, ANALYTICAL) (SHEMIAKIN, F.M.) (KARPOV, A.N.)
(BRUSENTOV, A.N.)

5(2),5(3)

AD 00000:

Busov, A. I., Tiptsova, V. G.

001/75-14-1-1/2

ABSTRACT:

A Study of the Analytical Chemistry of Thallium (Issledovaniye v oblasti analiticheskoy khimii talliya)
Communication 2. Precipitation Reaction of Trivalent Thallium Bromide Complexes with Some Pyrazolone Derivatives
(Soobshcheniye 2. Reaktsii osazhdeniya kompleksov trekhvalentnogo talliya nekotorymi proizvodnymi pirazolonov)

PERIODICAL:

Zhurnal analiticheskoy khimii, 1959, Vol 14, No 1, pp 24-36 (USSR)

ABSTRACT:

The authors of the present paper investigated the precipitation reaction of thallium bromide complexes with some pyrazolone derivatives and determined the composition of the deriving compounds as well as their properties. It was found that the ion of trivalent thallium reacts in the presence of bromine ions with pyrimidon, antipyrin, diantipyryl methane and diantipyryl phenyl methane, causing corresponding compounds with the formulas $C_{13}H_{17}ON_5 \cdot HgBr_4$, $(C_{11}H_{12}O_2)_2 \cdot HgBr_4$,

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$C_{23}H_{24}O_2N_4 \cdot HgBr_4$ and $(C_{11}H_{11}ON_2)_2CHC_6H_5 \cdot HgBr_4$ to result.

A Study of the Analytical Chemistry of Thallium. SOV/75-14-1-5/22
 Communication 2. Precipitation Reaction of Trivalent Thallium Bromide
 Complexes With Some Pyrazolone Derivatives

On investigating the properties of the mentioned compounds, the
 compounds $C_{13}H_{17}ON_3 \cdot HgBr_4$, $(C_{11}H_{12}ON_2)_2 \cdot HgBr_4$ and

$C_{29}H_{28}O_2N_4 \cdot HgBr_4$ were found to be unsuitable for the
 determination of thallium. The compound with pyrimidin is
 considerably soluble in water, moreover thallium is not
 precipitated quantitatively. The compound with antipyrin also
 possesses considerable solubility. The compound with
 diantipyryl phenyl methane finally, cannot be used for the
 gravimetric determination of thallium because the reagent is
 difficult to solve in water and the same applies for the
 bromide of diantipyryl phenyl methane, so that it precipitates
 along with the precipitation of the thallium complex. The
 compound with diantipyryl methane $C_{23}H_{24}O_2N_4 \cdot HgBr_4$ permits a
 gravimetric as well as an amperometric determination of
 thallium. The respective determination methods were worked out
 and are accurately described. Copper and zinc do not disturb
 the determination. Cadmium can be kept in the solution by
 choosing the bromide concentration.

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 A Study of the Analytical Chemistry of Thallium.
 Communication 2. Precipitation Reaction of Trivalent Thallium Bromide
 Complexes With Some Pyrazolone Derivatives

Bismuth must be removed by the aid of "Complexon" III.
 Antimony is bound to a complex by tartaric acid. The
 disturbance in the reaction (1) is eliminated by
 "Complexon" III. There are 2 figures, 6 tables, and
 19 references, 17 of which are Soviet.

ABSTRACT : Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova
 (Moscow State University named M. V. Lomonosov)

RECEIVED: July 27, 1957

Card 3/3

BUSEV, A.I.; KANAYEV, N.A.

Calculation of the stability constant of some indium complexes
by the constant variation method from data obtained by the use of
cationites. Vest.Mosk.un.Ser.mat., mekh., astron., fiz., khim.
14 no.1:135-143 '59. (MIRA 13:8)

1. Kafedra analiticheskoy khimii Moskovskogo universiteta.
(Indium compounds)

BUSEV, A.I.; LI GYN

Use of platinum and mercury electrodes in chromometric determination of molybdenum in the presence of some other elements. Vest. Mosk.un.Ser.mat., mekh., astron., fiz., khim. 14 no.1:187-194 (MIRA 13:8) '59.

1. Kafedra analiticheskoy khimii Moskovskogo universiteta.
(Molybdenum--Analysis)

BUSEV, A.I.;CHZHAN FAN' [Chang Fan]

Direct complexometric determination of hexavalent molybdenum.
Vest Mosk. un. Ser. mat., mekh., astron., fiz., khim. 14 no.2:
203-210 '59 (MIRA 13:3)

1. Kafedra analiticheskoy khimii Moskovskogo gosuniversiteta.
(Molybdenum--Analysis)

5(2), 5(3)

SOV/75-14-2-19/27

AUTHORS: Busev, A. I., Ivanyutin, M. I.

TITLE: On the Reaction of the Oxidation of Dialkyl- and Diaryldithiophosphates With Iodine and Their Titrimetric Determination
(O reaktsii okisleniya dialkil- i diarilditiofosfatov vodom i ikh titrimetricheskom opredelenii)

PERIODICAL: Zhurnal analiticheskoy khimii, 1959, Vol 14, Nr 2, pp 244-245 (USSR)

ABSTRACT: The investigations carried out by the authors showed that in the oxidation of dithiophosphates with an iodine excess in alkaline solution well reproducible and very accurate results are obtained. In this connection 1 mol of nickel-diethyldithiophosphate consumed 16 mols of iodine. Similar results were obtained also with pyridine-diphenyldithiophosphate. The iodine consumption for the oxidation of different amounts of nickel-diethyldithiophosphate is tabulated. From these results the following equations for the oxidation of dithiophosphates with iodine in highly alkaline solution are ascertained:

$$(RO)_2PSS^- + 16 J_2 + 40 OH^- = (RO)_2POO^- + 4SO_4^{2-} + 32 J^- + 20 H_2O.$$

R denotes an alkyl- or aryl radical. The oxidation of nickel-diethyldithiophosphate takes place rapidly in a highly alkaline solution. A change of the alkali concentration within the

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On the Reaction of the Oxidation of Dialkyl- and Diaryldithiophosphates
With Iodine and Their Titrimetric Determination

limits of 0.5 - 1.5 n influences only the rate of the reaction and not the iodine consumption. In 1 n alkaline solutions the complete oxidation of nickel—diethyldithiophosphate takes 5 - 10 minutes. Iodine consumption does not depend on its excess. The order of the addition of lye and iodine influences the consumption of iodine only if the iodine excess is immediately titrated back with thiosulphate solution. If the solution is kept for ten minutes the order of the addition of lye and iodine is of no importance. The reaction described makes it possible to determine small amounts of dithiophosphates with high accuracy. The method is especially valuable if dithiophosphate has a low melting point, and, therefore, cannot be dried at 105° (dithiophosphates of lead, bismuth etc). The method devised was used for the determination of cadmium. The determination is described in detail in this paper. The results of the titrimetric determinations are tabulated. The determination error is $\pm 0.5\%$ and is higher only in individual cases ($\sim 2\%$). The results of the determination of nickel, cadmium, lead, bismuth, and indium according to this method are summarized in a table. There are 3 tables and 2 Soviet

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SOV/75-14-2-19/27
On the Reaction of the Oxidation of Dialkyl- and Diaryldithiophosphates
With Iodine and Their Titrimetric Determination

references.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova
(Moscow State University imeni M. V. Lomonosov)

SUBMITTED: December 17, 1957

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5(2), 5(3)

SOV/75-14-2-26/27

AUTHORS: Busev, A. I., Polyanskiy, N. G.

TITLE: Book Reviews and Bibliography (Kritika i bibliografiya)

PERIODICAL: Zhurnal analiticheskoy khimii, 1959, Vol 14, Nr 2, pp 255-256
(USSR)

ABSTRACT: The present paper gives a detailed review of the book "Chemistry of Metal Chelate Compounds" by A. E. Martell and M. Calvin (VI + 576 pages) published by the publishing house Chemie G.m.b.H. Weinheim/Bergstrasse; 1958.

Card 1/1

BUSEV, A.I.; SHKROBOT, E.P.

Determination of indium and gallium in morin. Vest.Mosk.un.Ser.
mat., mekh., astron., fiz., khim. 14 no.4:199-206 '59. (MIRA 13:8)

1. Kafedra analiticheskoy khimii Moskovskogo universiteta.
(Indium--Analysis)
(Gallium--Analysis)

5 (2)

AUTHORS:

Busev, A. I., Chang Fan

SOV/75-14-4-11/30

TITLE:

On the Complexometric Determination of Molybdenum After Its
Reduction to the Pentavalent State

PERIODICAL:

Zhurnal analiticheskoy khimii, 1959, Vol 14, Nr 4, pp 445-450 (USSR)

ABSTRACT:

Pentavalent molybdenum reacts with Complexon III in the molar ratio 2:1 (Ref 1). The otherwise easily hydrolyzable pentavalent molybdenum does not precipitate, in the presence of surplus Complexon III, even in a strongly alkaline medium, which indicates a high stability of the formed complex compound. The boundaries of acidity for the formation of the compound of Mo(V) with Complexon III were photometrically investigated. A hydrochloric solution of hydrazine was used for the reduction of hexavalent molybdenum to the pentavalent state. The preparation and purification of the reagents used are described in an experimental part. The molar extinction coefficients of the complex of Mo(V) with Complexon III at different pH-values are shown in table 1. These coefficients were determined at 387.5 m μ . It appeared that pentavalent molybdenum, when heated with Complexon III, reacts within the range of 0.5 M hydrochloric acid quantitatively up to pH 10, by forming complexes. While the

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On the Complexometric Determination of Molybdenum
After Its Reduction to the Pentavalent State

SOV/75-14-4-11/30

reaction proceeds only slowly in 0.5 M HCl at room temperature, the complex forms at sufficient velocity during heating. The authors worked out a method of the complexometric determination of molybdenum. The conditions of the quantitative reduction of hexavalent molybdenum with hydrazine were investigated (influence of the acidity, the amount of hydrazine, and the length of the reaction). The results are shown by table 2. The conditions of a quantitative reduction are: acid concentration > 0.3 M, amount of hydrochloric hydrazine > 10 mg/40 ml of solution, and boiling of the solution for 2 minutes. The realization of the reduction is described in detail. Since there is no suitable indicator for pentavalent molybdenum, the complexometric determination was done indirectly. The method is based on the retitration of the Complexon-III surplus with zinc-sulfate solution at pH 10, by using chromogene black ET-00 as an indicator. The realization of this condition is mentioned in detail. The results of some determinations are shown in table 3. The accuracy is satisfactory. If the solution of pentavalent molybdenum with an excess of Complexon III is not heated up to the boil before the titration, and if the titration is not carried

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On the Complexometric Determination of Molybdenum
After Its Reduction to the Pentavalent State

SOV/75-14-4-11/30

out at 40-60°, too low results are obtained (Table 4). Table 5 shows the results of the determination of molybdenum in the presence of foreign ions. Iron and great amounts of tungsten, as well as tartrates, citrates, oxalates, nitrates, nitrites, and other oxidation agents have a disturbing effect. The determination of molybdenum may also be carried out directly by photometric titration with Complexon III in acid solution. The results of some determinations by this method are shown in table 6. Direct titration may be carried out at pH 0.8-1.8. The determination was made on a spectrophotometer SF-4 at 387.5 mμ. There are 2 figures, 6 tables, and 5 references, 2 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova
(Moscow State University imeni M. V. Lomonosov)

SUBMITTED: January 7, 1959

Card 3/3

KORENMAN, Izrail' Mironovich; VINOGRADOV, A.P., akademik, glavnyy red.;
BUSEV, A.I., prof., red.toma; ALIMARIN, I.P., red.; BABKO, A.K.,
red.; VAYNSHTEYN, E.Ye., red.; YERMAKOV, A.N., red.; KUZNETSOV,
V.I., prof., red.; PALEY, P.N., red.; RYABCHIKOV, D.I., red.;
TANANAYEV, I.V., red.; CHERNIKHOF, Yu.A., red.; VOLYNETS, M.P.,
red.izd-va; KASHINA, P.S., tekhn.red.

[Analytical chemistry of thallium] Analiticheskaya khimiya
talliia. Moskva, Izd-vo Akad.nauk SSSR, 1960. 170 p.
(MIRA 14:3)

(Thallium--Analysis)

SOV/32-25-1-17/51

5(2)

AUTHORS:

Busev, A. I., Li Kang

TITLE:

Successive Determination of Iron, Copper and Titanium in Ferro-titanium According to the Chromometric Method (Posledovatel'noye opredeleniye zheleza, medi i titana v ferrotitane khromometri-cheskim metodom)

PERIODICAL:

Zavodskaya Laboratoriya, 1959, Vol 25, Nr 1, pp 30-34 (USSR)

ABSTRACT:

A titration of Ti^{4+} with a $CrCl_2$ solution carried out first by Brintzinger and Schieferdecker (Brinttsinger and Shifer-deker) (Ref 1) did not yield satisfactory results in experiments made by Lingane (Lingeyn) (Ref 2) and by the authors of the present paper. The titration curves showed no marked stages. It was ascertained that the reason for this is to be found in the platinum electrode. On exchanging the Pt-electrode by a Hg-, tungsten or graphite electrode, distinct potential jumps were obtained (Fig 1). A deficiency of the Hg-electrode is that in the presence of an oxidizing agent, e.g. trivalent iron, a potential jump occurs corresponding to the sum of Fe^{3+} and Ti^{4+} reduction. In such cases a successive titration must take place,

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Successive Determination of Iron, Copper and Titanium in Ferrotitanium According to the Chromometric Method

i.e., iron is first titrated with the Pt-electrode and the electrode is then exchanged by an Hg-electrode, and titanium is titrated (Fig 2). In this way also Cu^{2+} (Pt-electrode) and Ti^{4+} (Hg-electrode) can be titrated (Fig 3), or Fe^{3+} and Cu^{2+} in addition to Ti^{4+} (Fig 4). Tungsten electrodes allow all three mentioned elements to be titrated successively (Fig 5), which means an important simplification of the titration technique and is therefore recommended for adoption in work laboratories. An analysis step according to the described titration form on a ferrotitanium (as well as results obtained with the standard sample No 50 with 20.75% Ti and 1.37% Cu) is mentioned. There are 3 figures, 1 table, and 6 references, 1 of which is Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova
(Moscow State University imeni M. V. Lomonosov)

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SOV/32-25-6-9/53

5(2)

AUTHORS: Busev, A. I., Polyak, L. Ya.

TITLE: Determination of Cadmium in Magnesium Alloys With the Use of Nickel Diethyl Dithiophosphate (Opredeleniye kadmiya v magniyevykh splavakh s primeneniyem dietilditiofosfata nikelya)

PERIODICAL: Zavodskaya Laboratoriya, 1959, Vol 25, Nr 6, pp 668 - 669 (USSR)

ABSTRACT: A method was introduced, to be applied for the gravimetric as well as the volumetric determination of cadmium in magnesium alloys. Zn, Al, Ce, Zr et al may be present as well. The method is based on the precipitation of Cd with nickel diethyl dithiophosphate and the weighing of the precipitate $[(C_2H_5O)_2PSS]_2Cd$ or a titration of the precipitate with a 0.05 n iodine solution. The presence of Mg and of the abovementioned alloy elements of magnesium alloys does not disturb the determination (Table 1). The iodometric titration is based on the reaction:
 $[(C_2H_5O)_2PSS]_2Ni + J_2 = (C_2H_5O)_2PSS - SSP(OC_2H_5)_2 + NiJ_2$
 and is considerably quicker than the gravimetric determination, the analytical accuracy being the same (Table 2). The course

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Determination of Cadmium in Magnesium Alloys With the SOV/32-25-6-9/53
Use of Nickel Diethyl Dithiophosphate

of analysis is described. There are 2 tables and 2 Soviet
references.

Card 2/2

~~BUSEV, A.I.~~ SOKOLOVA, N.V., tekhn.red.

[Use of compounds of divalent chromium in analytical chemistry]
Primenenie soedinenii dvukhvalatnogo khroma v analiticheskoi
khimii. Moskva, Vses.in-t nauchno-tekhn.informatsii, 1960.
160 p. (MIRA 14:4)
(Chromium salts) (Chemistry, Analytical)

RYABCHIKOV, Dmitriy Ivanovich; GOL'BRAYKH, Yevgeniya Kas'yanovna; VINOGRADOV, A.P., akademik, glavnyy red.; ALIMARIN, I.P., red.toma; PALEY, P.N., red.toma; BABKO, A.K., red.; BUSEV, A.I., red.; VAYNSHTEYN, E.Ye., red.; YERMAKOV, A.N., red.; KUZNETSOV, V.I., red.; TANANAYEV, I.V., red.; CHERNIKHOV, Yu.A., red.; TRIFONOV, D.N., red.izd-vs; POLENOVA, T.P., tekhn.red.

[Analytical chemistry of thorium] Analiticheskaya khimiya toriya.
Moskva, Izd-vo Akad.nauk SSSR, 1960. 295 p. (MIRA 13:10)
(Thorium--Analysis)

BUSEV, A.I.; BYR'KO, V.M.

Consecutive radiometric titration of some elements by the sodium salt of 1-dithiocarboxy-3-methyl-5-phenylpyrazoline, containing sulfur-35. Izv.vys.ucheb.zav.; khim.i khim tekhn. 3 no.1:52-55 '60. (MIRA 13:6)

1. Kafedra analiticheskoy khimii Moskovskogo gosudarstvennogo universiteta imeni M.V. Lomonosova.
(Metals--Analysis) (Pyrazoline)

BUSEV, A.I.; TIPSOVA, V.G.

Determination of thallium in its antimony, arsenic, and phosphorus alloys. Izv.vys.ucheb.zav.; khim.i khim tekhn. 3 no.1:69-71 '60.

(MIRA 13:6)

1. Kafedra analiticheskoy khimii Moskovskogo gosudarstvennogo universiteta imeni M.V.Lomonosova.

(Thallium alloys)

(Thallium--Analysis)

5.5210

77748

SOV/75-15-1-10/29

AUTHORS: Busev, A. I., Zholondkovskaya, T. N., Kuznetsova, Z. M.

TITLE: Separation of Gallium and Indium by the Diethyldithiocarbamate Method

PERIODICAL: Zhurnal analiticheskoy khimii, 1960, Vol 15, Nr 1, pp 50-56 (USSR)

ABSTRACT: Conditions of Ga and In separation by precipitating In with sodium diethyldithiocarbamate or extracting it with ethyl acetate were studied. A review of the literature dealing with the determination and separation of Ga and In is also given. The following solutions were used: standard gallium nitrate solution (1 mg Ga/ml); standard indium nitrate solution (2.5 mg In/ml); 2% aqueous sodium diethyldithiocarbamate solution; and the following buffer solutions:

0,2M CH₃COOH + 0,2M CH₃COONa, pH 3,72-5,57,

0,2M KCl + 0,2M HCl, pH 1,00-2,20,

0,2M H₃BO₃ + 0,05M Na₂B₄O₇, pH 7,09-9,11.

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Separation of Gallium and Indium by the Diethyl- 77748
dithiocarbamate Method SOV/75-15-1-10/29

The data obtained show that quantitative precipitation of gallium with sodium diethyldithiocarbamate takes place at pH 2.7-5.0, but has no practical value since precipitation of many other elements also takes place under the same conditions. Precipitation of indium with sodium diethyldithiocarbamate is more selective;

tartrates, oxalates, and sulfosalicylic acid do not interfere. It was found that indium diethyldithiocarbamate can be quantitatively extracted with ethyl acetate at pH 3-5 in an excess of sodium oxalate. It is proposed to separate Ga and In by precipitating indium with sodium diethyldithiocarbamate or extracting it with ethyl acetate at pH 3-5 in an excess of sodium oxalate. Experimental error for In and Ga is 1-3% at a In/Ga ratio from 2:1 to 1:10. The results of Ga and In separation by precipitation are shown in Table 10. Separation of In and Ga by extraction is illustrated by data shown in Table 11. There are 11 tables; and 35 references, 8 U.S., 3 U.S., 3 U.K., 14 German, 1 Japanese,

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Separation of Gallium and Indium by the Diethyl- 77748
dithiocarbamate Method

SOV/75-15-1-10/29

Table 10. Precipitation of In with sodium diethyldithiocarbamate in the presence of gallium (at pH 3-4) in excess of sodium oxalate: (a) taken (mg); (b) ratio In: Ga; (c) In found (mg); (d) error of In determination; (e) absolute (mg); (f) relative (%); (g) Ga found (mg); (h) error of Ga determination; (i) absolute (mg); (j) relative (%).

a		b	c	d		g	h	
In	Ga			e	f		i	j
2,39	19,68	1 : 8	2,44	+0,05	+2,1	19,89	+0,21	+1,06
2,39	19,68	1 : 8	2,46	+0,07	+2,9	19,82	+0,14	+0,7
2,99	4,92	1 : 2	2,97	-0,02	-0,7	4,96	+0,04	+0,8
5,98	4,92	1 : 1	5,79	-0,19	-3,1	4,94	+0,02	+0,4
5,98	4,92	1 : 1	5,95	-0,02	-0,3	4,96	+0,04	+0,8
5,98	4,92	1 : 1	6,03	+0,05	+0,8	4,79	-0,13	-2,6
5,98	4,92	1 : 1	6,04	+0,06	+1,0	4,93	+0,01	+0,2
5,98	2,46	2 : 1	6,01	+0,03	+0,5	2,30	-0,16	-3,3
5,98	2,46	2 : 1	5,90	-0,08	-1,3	2,50	+0,04	+0,8

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Separation of Gallium and Indium by the Diethyl-
dithiocarbamate Method

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SOV/75-15-1-10/29

Table 11. Separation of In and Ga by extracting indium diethyldithiocarbamate with ethyl acetate in an excess of sodium oxalate (pH 3-5) (a) taken (mg), (b) ratio In: Ga, (c) found In (mg), (d) error of In determination, (e) absolute (mg), (f) relative (%), (g) found Ga (mg), (h) error of Ga determination, (i) absolute (mg), (j) relative (%)

a		b	c	d		g	h	
In	Ga			e	f		i	j
4.74	5.78	1 : 1	4.74	—	—	5.80	+0.02	+0.3
2.84	5.78	1 : 2	2.85	+0.01	+0.4	5.80	+0.02	+0.3
2.94	15.02	1 : 5	3.00	+0.06	+2.0	14.96	-0.06	-0.4
2.94	30.04	1 : 10	2.96	+0.02	+0.7	29.97	-0.07	-0.2

Card 4/5

S/137/62/000/004/200/201
A154/A101

AUTHORS: Busev, A. I. Tiptsova, V. G.

TITLE: The analytical chemistry of thallium to-day

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 4, 1962, 13, abstract 4X81
("Metody opredeleniya i analiza redk. elementov", Moscow, AN SSSR,
1961, 182 - 200)

TEXT: This is a review. A classification of analytical methods of determining Tl is given. Analytical reactions of an ion of univalent Tl and an ion of trivalent Tl are given. There are 280 references.

I. Golubeva ✓

[Abstracter's note: Complete translation]

Card 1/1

S/137/62/000/001/224/237
A154/A101

AUTHORS: Busev, A. I., Skrebkova, L. M.

TITLE: The present state of the analytical chemistry of gallium

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 1, 1962, 8, abstract 1K51
(V sb. "Metody opredeleniya i analiza redk. elementov". Moscow,
AN SSSR, 1961, 201-237)

TEXT: This review gives methods for the following: Spectral determination of low contents of In and Tl in silicate rocks: Spectral determination of Ga, Ge, In and Tl in rocks, concentrates and waste products of the zinc, lead, tin and copper industry. Rapid spectral determination of Tl and In in sulfide and silicate ores. Spectral determination of In and Tl in ores, minerals and rocks. Flame-photometric determination of In, Ga and Tl in concentrates and industrial semiproducts. Concentration and spectrophotometric determination of small amounts of Tl in alkaline rocks. Colorimetric determination of minute amounts (of the order of micrograms) of Tl in rocks and ores. Extraction-photometric determination of Tl with crystal violet. Trilonometric determination of Tl in alloys. Chemico-spectral determination of Al, In, Cd, Mg, Mn, Cu, Ni, Pb, Ag

Card 1/2

The present state of the analytical ...

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A154/A101

and Zn in metallic Tl and Tl chloride. Polarographic determination of In in complex ores and the products of reprocessing of the latter. Fluorometric and photometric determination of In with 6 X(6Zh) rhodamine. Chemico-spectral determination of Al, Bi, Cd, Co, Mg, Cu, Ni, Pb, Ag and Zn in metallic In. Colorimetric determination of minute amounts (of the order of micrograms) of Hg in metallic In. Spectral determination of Ga in silicate rocks and minerals. Determination of Ga with C (S) rhodamine in the semiproducts and wastes of Al production. Spectral and chemico-spectral determination of admixtures in Ga and its chloride. There are 91 references.

N. Gertseva

[Abstracter's note: Complete translation]

Card 2/2

S/137/62/000/001/227/237
A154/A101

AUTHOR: Busev, A. I.

TITLE: The present state of the analytical chemistry of molybdenum

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 1, 1962, 10, abstract 1K65
(V sb: "Metody opredeleniya i analiza redk. elementov". Moscow,
AN SSSR, 1961, 537-579)

TEXT: This review gives methods for the following: Spectral determination of small amounts of Mo and W in silicate rocks and minerals. Chemico-spectral quantitative determination of low contents of Mo and W in silicate rocks. Chemico-spectral quantitative determination of low Mo and W contents in Fe-meteorites. Colorimetric determination of minute amounts (of the order of micrograms) of Mo in raw minerals with morin. Polarographic determination of microgram amounts of Mo by a catalytic current. Polarographic determination of large amounts of Mo in raw minerals. Gravimetric and volumetric determination of Mo in alloys and concentrates. Volumetric determination of Mo in ferromolybdenum and permalloy with methylene blue. Gravimetric determination of W in ferrotungsten. Gravimetric determination of W in ferrotungsten with

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S/137/62/000/001/227/237
A154/A101

The present state of the analytical ...

β -naphthoquinoline. Photometric determination of Mo in Ti-based alloys. Photometric determination of Mo in steel and sodium tungstate. Colorimetric determination of P in chromium-based alloys. Spectrophotometric determination of Mo in alloys. Determination of Mo in Ti-Mo alloys with the aid of ion-exchange chromatography. Chemico-spectral determination of W in Mo. Spectral determination of Cd, Bi, Sb, Sn and Pb in Mo and W. Spectral determination of admixtures in W. Gravimetric and photometric determination of Th in metallic W. Polarographic determination of microgram amounts of Sn and Pb in metallic Mo. Photometric determination of microgram amounts of Bi in metallic Mo. Colorimetric determination of P in metallic W and ferrotungsten. Colorimetric determination of Ti in W. Colorimetric determination of Be in W. Determination of the total amount of alkali and alkaline-earth metals in W with the aid of a high-voltage electrodialyzer. Determination of Pb, Cd, Bi, Sb and Sn in Mo by the oscillographic polarography method. There are 175 references.

N. Gertseva

[Abstracter's note: Complete translation]

Card 2/2

BUSEV, A.I.; CHZHAN FAN' [Chang Fan]

Interaction of sexivalent molybdenum with disodium salt of
pyrocatechol-3, 5-disulfonic acid (tairon). Izv.vys.ucheb.zav.;
khim.i khim.tekh. 4 no.6:905-913 '61. (MIRA 15:3)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova,
kafedra analiticheskoy khimii.
(Molybdenum compounds) (Pyrocatecholdisulfonic acid)

S/153/61/004/006/002/008
E021/E453

AUTHORS: Busev, A.I., Ivanov, V.M.

TITLE: The photometric determination of thorium by
pyridyl-(2-azo-4)-resorcinol

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy.
Khimiya i khimicheskaya tekhnologiya, v.4, no.6, 1961,
914-922

TEXT: The reaction between the thorium ion and pyridyl-(2-azo-4)-resorcinol with the formation of a red-coloured compound was studied. A thorium nitrate solution was prepared from the commercial salt and the absence of cerium in the solution was confirmed. The thorium concentration was determined by precipitation with ammonia free of carbonate and roasting the precipitate to constant weight at 1000°C. The thorium content of the initial solution was found to be 2.29 mg/ml. 10.14 ml of this solution was acidified with 1 ml concentrated nitric acid and diluted with water to 1 litre. The pyridyl-(2-azo-4)-resorcinol (PAR) was synthesized by the method
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S/153/61/004/006/002/002
EO21/E453

The photometric determination ...

developed by A.Ye.Chichibabin and recrystallized from ethyl alcohol. A solution containing 10^{-4} mol/litre PAR was prepared. A buffer solution was prepared from sodium acetate and hydrochloric acid (A.R. quality). The pH was controlled by a glass electrode and a potentiometer. The optical density of the solutions was measured on a spectrophotometer in a rectangular quartz cell with thickness 10.01 mm, and on a photoelectrocolorimeter. Optimum conditions for the reaction between thorium ions and PAR were found; molar ratios during the reaction were established as Th:PAR 1:4. It was established that the solutions obeyed Beer's law. It was further shown that a complexonometric determination of thorium in the presence of PAR was not feasible. The influence of the rare-earth elements on the results of the photometric determination of thorium was investigated and a method for thorium assay under these conditions was developed. The method was used for the determination of thorium in monazite sand without separation of the thorium. There are 6 figures and 7 tables.

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The photometric determination ... S/153/61/004/006/002/008
E021/E453

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im.
M.V.Lomonosova. Kafedra analiticheskoy khimii
(Moscow State University imeni M.V.Lomonosov
Department of Analytical Chemistry)

SUBMITTED: April 17, 1960

Card 3/3

BUSEV, A.I.; CHZHAN FAN' [Chang Fan]; KUZUYAYEVA, Z.P.

Unithiol as a reagent for molybdenum. Zhur. VKHO 6 no.2:237-238
'61. (MIRA 14:3)

1. Moskovskiy gosudarstvennyy universitet imeni M. V. Lomonosova.
(Molybdenum—Analysis)

BUSEV, A.I.; TALIPOVA, L.L.; IVANOV, V.M.

Direct complexometric titration of trivalent thallium in
the presence of 7-(2-pyridylazo)-8-quinolinol as an indicator.
Zhur.VKHO 6 no.5:598 '61. (MIRA 14:10)

1. Moskovskiy gosudarstvennyy universitet imeni M.V.Lomonosova.
(Thallium--Analysis)

BUSEV, A.I.; CHZHAN FAN' [Chang Fan]

Reaction of molybdenum with 2,2',4'-trihydroxy-5-chloro(1-azo-1')-
benzene-3-sulfonic acid (lumogallion). Zhur.neorg.khim. 6 no.6:
1308-1318 Je '61. (MIRA 14:11)

1. Moskovskiy gosudarstvennyy universitet, Khimicheskoy fakul'tet,
Kafedra analiticheskoy khimii.
(Molybdenum) (Azo dyes)

BUSEV, A.I.; BAZHANOVA, L.A.

Extraction of bismuth dithizonate. Zhur.neorg.khim. 6 no.9:
2210-2215 S '61. (MIRA 14:9)
(Bismuth) (Dithizone)

BUSEV, A.I.; BAZHANOVA, L.A.

Extraction of bismuth with derivatives of 1,5-diphenylthiocarbazone
(dithizone). Zhur.neorg.khim. 6 no.12:2805-2808 D '61.
(MIRA 14:12)

(Bismuth) (Dithizone)

S/075/61/016/001/008/019
B013/B055

AUTHORS: Busev, A. I. and Chzhan Fan'

TITLE: On Compounds of Molybdenum and Thioglycolic Acid and a New
Photometric Method of Determining Molybdenum

PERIODICAL: Zhurnal analiticheskoy khimii, 1961, Vol. 16, No. 1, pp. 39-50

TEXT: The present work explains the valency of molybdenum in compounds with thioglycolic acid and the mechanism of the reaction of molybdates with thioglycolic acid. The studies undertaken in this connection yielded the following results: Under certain conditions molybdenum forms yellow compounds with thioglycolic acid in which the metal possesses the valency 5 or 6. The absorption curves of these compounds have peaks at 352.5 mμ and 365 mμ, respectively (Fig. 1). The molar extinction coefficient of the thioglycolic-acid compound of molybdenum (VI) is 4400 at 365 mμ and the optimum pH, the corresponding value for the molybdenum (V) compound is 2400 (Tab. 1). In both valency stages molybdenum reacts with thioglycolic acid (R) in the molar ratio Mo : R = 1 : 2. This molar ratio was found by both the method of the isomolar series (Figs. 5-7) and the slope of the straight Card 1/4

On Compounds of Molybdenum and Thioglycolic S/075/61/016/001/008/019
 Acid and a New Photometric Method of Determin- B013/B055
 ing Molybdenum

line in the coordinates $\log ([\text{Mo}(\text{SR})_n] / [\text{Mo}]_{\text{resid.}})$ and $\log [\text{RSH}]_{\text{resid.}}$
 (Fig. 8, Tab. 3). The significance of these coordinates follows from the

equation $\text{Mo}^{\text{VI,V}} + n(\text{RSH}) = \text{Mo}(\text{SR})_n + n\text{H}^+$; $K = \frac{[\text{Mo}(\text{SR})_n] \cdot [\text{H}^+]^n}{[\text{Mo}^{\text{VI,V}}]_{\text{resid.}} \cdot [\text{RSH}]_{\text{resid.}}^n}$ ✓

Trivalent molybdenum does not form any yellow compound with thioglycolic acid. The stability of the compounds of penta- and hexavalent molybdenum with thioglycolic acid depends on the acidity of the solutions (Fig. 2). By pH variation of solutions containing excess thioglycolic acid, the molybdenum can be quantitatively transformed from the pentavalent to the hexavalent stage, and vice versa. This is confirmed by iodometric titration data (Tab. 2). In a moderately acid medium ($\text{pH} < 2.5$) the compound formed by molybdenum (VI) and thioglycolic acid is unstable and thioglycolic acid reduces the molybdenum (VI) to the pentavalent stage (Fig. 3) with formation of the corresponding compound with excess thioglycolic acid. This molybdenum (V) compound is stable in acid solution ($\text{pH} 0.7 - 6$). This reduction of molybdenum (VI) to molybdenum (V) by thioglycolic acid is

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On Compounds of Molybdenum and Thioglycolic Acid and a New Photometric Method of Determining Molybdenum S/075/61/016/001/008/019 B013/B055

only complete in acid solution, in weakly acid solution (pH 2.5 - 6) the same reduction requires a large excess of the reagent and is very slow (Fig. 4). Without excess of thioglycolic acid, the molybdenum (VI) compound is sufficiently stable at pH 2.5 - 6. At higher pH values, the molybdenum (V) in the thioglycolic-acid compound shows a tendency to oxidize to the hexavalent stage. The selectivity of the reaction of molybdenum (V) with thioglycolic acid in weakly acid solution (0.3 M HCl) is very much higher than in the reaction of molybdenum (VI) at pH 3 - 5 (Tab. 4), the sensitivity, however, is slightly lower. The authors worked out a highly selective photometric method for the determination of small quantities of molybdenum (1 - 40 μ /ml) in alloy steel. The results are satisfactory (Tab. 5). Vanadium, large quantities of titanium, rare-earth elements, iron, copper, and tungsten do not interfere in the determination. There are 10 figures, 5 tables, and 16 references: 2 Soviet, 6 German, 1 Spanish, 3 British, 1 Czech, ~~Slovakian~~, and 3 US.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

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On Compounds of Molybdenum and Thioglycolic S/075/61/016/001/008/019
Acid and a New Photometric Method of Determin- B013/B055
ing Molybdenum

SUBMITTED: November 23, 1959

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Card 4/4

BUSEV, A. I.; TIPTOVE, V. G. [Tiptsova, V. G.]

Analytic chemistry of thallium. Analele chimie 16 no.1:50-71
Ja-Mr '61. (EEAI 10:9)

(Thallium)

BUSEV, A.I.; CHZHAN FAN' [Chang Fan]

Thiomalic acid as a reagent for the photometric determination of molybdenum. Zhur.anal.khim. 16 no.2:171-179 Mr-Apr.'61.
(MIRA 14:5)

1. Lomonosov Moscow State University.
(Molybdenum--Analysis)
(Succinic acid)

S/075/61/016/003/002/007
B106/B208

AUTHORS: Busev, A. I., and Tiptsova, V. G.

TITLE: Studies in the field of analytical chemistry of thallium.
Report no. 6. New complexometric methods of thallium determination

PERIODICAL: Zhurnal analiticheskoy khimii, v. 16, no. 3, 1961, 275-278

TEXT: The authors devised a method of indirect complexometric determination of trivalent thallium, in which the complexon III excess is back-titrated with a standard solution of Mohr's salt at 40-60°C in the presence of sulfosalicylic acid as indicator at pH 2. The color changes from yellow-green to orange-red. This method permits the determination of Tl^{3+} in the presence of Cd^{2+} , Zn^{2+} , Pb^{2+} , and $\leq 0.1MCl^-$, and thus offers more advantage than a direct complexometric titration at pH 2. Br^- ions interfere with the determination, as well as Bi, In, Fe, and Cu. Table 1 presents the results obtained by this method. For a separate determination of trivalent iron and thallium the fact may be used that at pH 2 trivalent thallium forms a
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B106/B208

stabler complex with Br^- than with complexon III. Thallium can thus be masked with bromide ions. Fe^{3+} ions quantitatively react with complexon III under these conditions. 5-10 ml of 2 M KBr solution and so much alcohol as to attain pH 2 are added to the acid solution containing Fe^{3+} and Tl^{3+} ; trivalent iron is then titrated with complexon III against sulfosalicylic acid as indicator at 40-60°C until the red-brown color disappears. The solution is then adjusted to pH 4-5 by adding ammonium acetate, and some drops of a 0.1% solution of pyridylazo-resorcinol or 1-(2-pyridylazo)-2-naphthol are added as indicator until a distinct red color appears. The trivalent thallium is now titrated with a complexon III solution until the color changes to orange-yellow. A distinct change can only be seen if the iron contents are not too high. This method gives good results (Table 2). The separate determination of Cu^{2+} or Bi^{3+} and Tl^{3+} is not possible by this method. For the separate determination of Bi^{3+} and Tl^{3+} , the sum Bi^{3+} and Tl^{3+} is first determined complexometrically at pH 4-5 (adjusted with ammonium acetate) against a 0.1% methanolic solution of 1-(2-pyridylazo)-2-naphthol as indicator, the color changing from red to yellow. Tl^{3+} is then

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reduced to Tl^+ by Na_2SO_3 . A certain amount of complexon III is thus set free which is back-titrated with a standard solution of $Cu(NO_3)_2$ (color change from yellow to red-violet). This method gives very good results, especially in the case of high thallium contents (Table 3). To determine the end point of the direct complexometric thallium titration, the reaction of the iodide complexes of trivalent thallium with complexon III may be used, which proceeds quantitatively at pH 6-8. Starch may be used as indicator: as long as thallium ions are present in the solution, which are not bound in the form of the complexonate, i.e., as long as TlI_4^- ions exist in the presence of I^- , also the ion I_3^- is present which colors the starch blue. In the end point of the direct thallium titration the blue color disappears. Some ml of 1 M tartaric acid solution and so much NH_4OH are added to the solution to be analyzed (3-30 ml in 80-100 ml) that the color of added tropaeolin 000 changes from yellow-orange to pink. 1 M tartaric acid solution is then added until the yellow-orange color appears again. 1 ml of a 1% KI solution is now added, forming a yellow precipitate. If the precipi-

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tate is pink, some further KI has to be added, but not too much, as otherwise TII may precipitate. The solution is then titrated with complexon III until the color changes from an intense yellow to pale-yellow. At that time, some ml of 1% starch solution are added, and titration is continued until the blue color disappears. Accuracy and reproducibility of this method are satisfactory (Table 4). At pH > 8 too low results are obtained, at pH < 6 too high ones. The method is not selective since many elements are interfering. There are 4 tables and 9 references: 3 Soviet-bloc and 6 non-Soviet-bloc. The three references to English-language publications read as follows: Kinnunen J., Wennerstrand B., *Chemyst-Analyst*. 46, 92 (1957); Foley W. T., Pottie R. F., *Anal. Chem.* 28, 1101 (1956); Reilley C.N., Schmidt R. W., *Anal. Chem.* 30, 947, 953 (1958).

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova
(Moscow State University imeni M. V. Lomonosov)

SUBMITTED: January 29, 1959

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BUSEV, A.I.; BAZHANOVA, L.A.

Color of inner complex bismuth salts with dithizone and its derivatives. Zhur. anal. khim. 16 no. 4:399-403 J1-Ag '61.
(MIRA 14:7)

1. M.V. Lomonosov Moscow State University.
(Bismuth compounds) (Dithizone)

BUSEV, A.I.; CHZHAN FAN'

Extraction-photometric determination of molybdenum by means of
6,7-dihydroxy-2,4-diphenylbenzopyrylium chloride. Zhur.anal.khim.
16 no.5:578-584 S-O '61. (MIRA 14:9)

1. Lomonosov Moscow State University.
(Molybdenum--Analysis) (Pyrylium compounds)

BUSEV, A.I.; BAZHANOVA, L.A.

Reversion-absorptiometry for determining bismuth. Vest.Mosk.Un.Ser.2:
khim. 16 no.6:47-50 N-D '61. (MIRA 14:11)

1. Moskovskiy gosudarstvennyy universitet. Kafedra analiticheskoy
khimii.

(Bismuth--Analysis)

BUSEV, A.I.; CHZHAN FAN¹; KUZUYAYEVA, Z.P.

2,3-Dimercaptopropionic acid as a reagent for molybdenum.
Zhur.anal.khim. 16 no.6:695-700 N-D '61. (MIRA 14:12)

1. M.V. Lomonosov Moscow State University.
(Molybdenum—Analysis)
(Propionic acid)

BUSEV, A.I.; BORZENKOVA, N.P.

Determination of copper traces in pure aluminum and indium by
means of nickel diethyldithiophosphate. Zav.lab. 27 no.1:13-15 '61.
(MIRA 14:3)

1. Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova.
(Copper--Analysis) (Aluminum--Analysis)
(Indium--Analysis)

BUSEV, A.I.; PETRENKO, A.G.; BYKHOVSKAYA, I.A.

Use of xylenc1 orange in the trilonometric determination of
aluminum. Zav.lab. 27 no.6:659-661 '61. (MIRA 14:6)

1. Moskovskiyy gosudarstvennyy universitet imeni M.V.Lomomcova.
(Aluminum--Analysis)

UDAL'TSOVA, N.I.; SAVVIN, S.B.; NEMODRUK, A.A.; NOVIKOV, Yu.P.;
DOBROLYUBSKAYA, T.S.; SINYAKOVA, S.I.; BILIMOVICH, G.N.;
SENDYUKOVA, A.S.; BELYAYEV, Yu.I.; YAKOVLEV, Yu.V.;
NEMODRUK, A.A.; CIMUTOVA, M.K.; GUSEV, N.I.; PALEY, P.N.;
VINOGRADOV, A.P., akademik, glav. red.; ALIMARIN, I.P.,
red.; BABKO, A.K., red.; ~~GUSEV, A.I., red.~~; VAYNSHTEYN, E.Ye.,
red.; YERMAKOV, A.N., red.; KUZNETSOV, V.I., red.; RYABCHIKOV,
D.I., red. toma; TANANAYEV, I.V., red.; CHERNIKHOV, Yu.A., red.;
SENYAVIN, M.M., red. toma; VOLYNETS, M.P., red.; NOVICHKOVA, N.D.,
tekhn. red.; GUS'KOVA, O.M., tekhn. red.

[Analytical chemistry of uranium] Analiticheskaya khimiya urana.
Moskva, Izd-vo Akad.nauk SSSR, 1962. 430 p. (MIRA 15:7)

1. Akademiya nauk SSSR. Institut geokhimii i analiticheskoy
khimii.

(Uranium--Analysis)

BUSEV, A.I.; IVANYUTIN, M.I.

Nickel deithyldithiophosphate. Met. poluch. khim. reak.
i prepar. no.6:33-35 '62. (MIRA 17:5)

1. Moskovskiy gosudarstvennyy universitet.

BUSEV, A.I.; TALIPOVA, L.L.

Azocines. Met. poluch. khim. reak. i prepar. no.6:35-40 '62.
(MIRA 17:5)

1. Moskovskiy gosudarstvennyy universitet.

BUSEV, A.I.; IVANOV, V.M.; TALIPOVA, L.L.

7-(2-pyridylazo)-8-hydroxyquinoline. Met. poluch. khim.
reak. i prepar. no.6:40-42 '62. (MIRA 17:5)

1. Moskovskiy gosudarstvennyy universitet.

BUSEV, A.I.; CHZHAN FAN' [Chang Fan]; KUZUYAYEVA, Z.P.

Sulfur-containing organic substances as reagents for molybdenum.

Izv.vys.ucheb.zav.; khim.i khim.tekh. 5 no.1:17-21 '62.

(MIRA 15:4)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova, kafedra
analiticheskoy khimii.

(Molybdenum--Analysis) (Sulfur compounds)

BUSEV, A.I.; SKREBKOVA, L.M.

Some piridine azo dyes as complexometric indicators for gallium.
Izv. Sib. otd. AN SSSR no.7:57-63 '62. (MIRA 17:8)

1. Moskovskiy gosudarstvennyy universitet.

BUSEV, A.I.; SKREBKOVA, L.M.

Precipitation and extraction of gallium as halo compounds with
bases of the antipyrine series. Zhur.anal.khim. 17 no.1:56-59
Ja-F '62. (MIRA 15:2)

1. M.V.Lomonosov Moscow State University.
(Gallium compounds) (Antipyrine)

BUSEV, A.I.; TALIPOVA, L.I.

Complexometric titration of indium in the presence of
7-(1-naphthylazo)-8-hydroxyquinoline-5-sulfonic acid and
7-(4-sulfo-1-naphthylazo)-8-hydroxyquinoline-5-sulfonic acid as
indicators. Vest.Mosk.un.Ser.2: Khim. 17 no.2:63-67 Mr~Ap
'62. (MIRA 15:4)

1. Kafedra analiticheskoy khimii Moskovskogo universiteta.
(Indium~Analysis) (Quinolinesulfonic acid)

BUSEV, A.I.; TALIPOVA, L.L.; SKREBKOVA, L.M.

Direct complexometric titration of gallium in the presence of
7-(naphthylazo)-8-hydroxyquinoline-5-sulfonic acid as an indicator.
Zhur.anal.khim. 17 no.2:180-185 Mr-Apr '62. (MIRA 15:4)

1. M.V.Lomonosov Moscow State University.
(Gallium--Analysis) (Complexons)

S/075/62/017/004/003/006
1017/1217

AUTHORS: Busev, A.I. and Tabipora, L.L.

TITLE: Direct complexometric titration of indium using azoderivatives of 8-hydroxyquinoline-5-sulfonic acid as indicators

PERIODICAL: Zhurnal analyticheskoy khimii, v.17, no.4, 1962, 447-456

TEXT: The synthesis of 14 derivatives of the 8-hydroxy-quinoline-5 sulfonic acid was carried out and the possibilities for their use as complexometric indicators was studied. It was found that the following compounds are suitable for complexometric titrations of indium: (a) 7-(1-naphthylazo)-8-hydroxyquinoline-5-sulfonic acid; (b) 7-(4-sulfo-2-naphthylazo)-8-hydroxyquinoline-5-sulfonic acid; (c) 7-(4,8-disulfo-2-naphthylazo)-8-hydroxy-quinoline-5-sulfonic acid; (d) 7-(5,7 disulfo-2-naphthylazo)-8-hydroxyquinoline-5-sulfonic acid. The elementary microanalysis of the constants of solutions were studied and tabulated. The color of the solid salt and of the aqueous solns. at different pH's are given. The pH range of the indicator color change for 30 similar compounds is tabulated. The indium complexes of some of

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S/075/62/017/004/003/006
1077/1217

Direct complexometric...

the above compounds (c) and (d), and also with 7-(5-sulfo-2-naphtylazo)-8-hydroxy-quinoline-5-sulfonic acid were studied. Photocolorimetric titrations show that indium reacts with the above reagents to form complexes at the molar ratio 1:1. These new reagents may be used successfully for the complexometric titration of indium ions at pH 2. Mg, Mn, Cd, Zn, Ca and Al in the presence of fluorides do not interfere. Titrations in presence of Al (and fluorides) are carried out in presence of precipitates and some experience is required. There are 4 figures and 5 tables.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova (Moscow State University im. M.V. Lomonosov)

SUBMITTED: January 29, 1960

Card 2/2

BUSEV, A.I.; IVANOV, V.M.; TIPTSOVA, V.G.

Iodate-complexometric method for determining thorium. Zav.lab. 28
no.7:799-800 '62. (MIRA 15:6)

1. Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova.
(Thorium—Analysis)

BUSEV, A.I.; IVANOV, V.M.

Photometric determination of indium by pyridine azo dyes. Izv.-
vys.ucheb.zav.;khim.i khim.tekh. 5 no.2:202-209 '62.

(MIRA 15:8)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova,
kafedra analiticheskoy khimii.
(Indium—Analysis) (Azo dyes)

BUSEV, A.I.; TALIPOVA, L.L.

Direct complexometric titration of indium with azo derivatives
of 8-hydroxyquinoline-5-sulfonic acid as indicators. Zhur.-
anal.khim. 17 no.4:447-456 J1 '62. (MIRA 15:8)

1. M.V.Lomonosov Moscow State University.
(Indium—Analysis) (Quinolinesulfonic acid)

BUSEV, Aleksey Ivanovich; VINOGRADOV, A.P., akademik, glav. red.;

ALIMARIN, I.P., red.; BABKO, A.K., red.; VAYNSHTEYN, E.Ye., red.; YERMAKOV, A.N., red.; KUZNETSOV, V.I., red.; PALEY, F.N., red.; RYABCHIKOV, D.I., red.; TANANAYEV, I.V., red.; CHERNIKHOV, Yu.A., red.; VOLYNETS, M.P., red.; MAKUNI, Ye.V., tekhn. red.

[Analytical chemistry of molybdenum] Analiticheskaya khimiya molibdena. [By] A.I. Busev. Moskva, Izd-vo Akad. nauk SSSR, 1962. 300 p.

(MIRA 16:1)

(Molybdenum—Analysis)